cal Transactions. Before accepting this view as to the excretion of the urine, further proof is sought for in the analysis of the liquor amnii, since there ought to be evidence of some of the constituents of urine in that fluid, if the view be correct. From analyses made by Rees, Frommberg, Wöhler, Gusserow, and others, the presence of urea and many of the salts of urine in the fluid of the amnion has been proved beyond question. On the other hand, the urine of the fœtus in some cases of congenital hydronephrosis has been found to be devoid of urea by Kennedy and Madge. It ought not, however, to be inferred from this that urea had never been formed in these fœtuses, but rather that, owing to the crystalloid character of urea, this substance has escaped from the blood and from the retained urine of the fœtus into the blood of the mother: and it is further suggested that urea may in this same way even disappear altogether from the liquor amnii when fresh quantities cease to be excreted from the fœtal organs. But, dismissing all speculative reasonings, it may be stated that the following are well-ascertained facts: (*a*) That when an obstruction has existed in the urinary organs of the fœtus, the secretion of urine has gone on to a sufficient extent to cause changes similar to those which are seen in the urinary organs of adults after retention. (*b*) That the liquor amnii has been proved to contain urea, besides many salts such as those which are formed in normal urine. (*c*) That fœtal urine in some cases of hydronephrosis has been found not to contain either urea or uric acid, or to contain urea only in very small quantity. The conclusions which appear to be warranted by these facts are: 1. That urine is secreted in considerable quantity during intra-uterine life. 2. That this quantity is far too great to be stored up in a normal bladder and normal ureters. 3. That during the latter part of gestation, at least, urine is passed off through the urethra of the fœtus into the sac of the amnion. 4. That the proportion of urea in fœtal urine is in all probability smaller than it is in the urine secreted after birth, and that, as in cases of congenital hydronephrosis both urea and uric acid have been absent from the urine, it is possible they may also be absent from the liquor amnii. 5. That the quantity of urea in liquor amnii is very small, not exceeding 5 per 1000. 6. That the gradual decrease in proportion of albumen in liquor amnii as pregnancy advances (from 10.77 per cent. in the fourth month to 0.82 at the ninth month, as stated by Taylor) gives some support to the view that the fluid of the amnion is constantly altered by the admixture of some non-albuminous fluid, such as urine, and that this conclusion will be further strengthened if future analyses show that the proportionate quantity of urea and the salts of urine in the liquor amnii increases as the proportionate quantity of albumen diminishes. 7. That the presence in liquor amnii of other of the constituents of normal urine, besides urea, gives support to the same opinion. Although there is something revolting in the idea that for a period of many weeks every human being has lived and floated in a medium partly composed of its own urine, yet the fact ought not to be ignored, as it is a matter of great interest and importance in the development of the life-history of the fœtus, while the condition of the fœtus which results from an obstruction to the escape of the urine ought to be borne in mind by the accoucheur, as it may give rise to tedious and protracted labour, or may even render parturition impossible to the mother till after the destruction of her child.—*Lancet*, May 13, 1876.

MATERIA MEDICA, GENERAL THERAPEUTICS, AND PHARMACY.

2. *Value of Alcohol as a Food in Fever Cases.*—Prof. C. BINZ, of Bonn, discusses this important subject in an interesting article in the *Practitioner* for May. He says that we must regard as a food any substance which, when taken into the system, can serve (1) towards building up the tissues, or (2) towards supplying the warmth and vital force necessary for the proper performance of the various functions of the body.

As the list of positive examples is so extensive, these points can better be illustrated by reference to certain negative ones. Thein, for instance, is not a food, as it passes through the system without undergoing decomposition; nor is ether a food, since it cannot be taken in quantities sufficiently large to contribute by its oxidation any appreciable weight, warmth, or vital energy[1] to the body. Gum Arabic is not a food, because it is not absorbed in the intestinal canal.

Alcohol fails, perhaps, to fulfil the first office of a food according to the foregoing definition, since it is incapable, as far as we know, of supplying material to build up the tissues, but when given in small doses, oft repeated, especially in the case of a sick person, it may be said to surpass all other substances as a species of easily burning fuel, from whose combustion the heat required to generate vital force may be derived. Indirectly, it also answers the first of the aforesaid purposes, for though it may furnish actually no new building material, it spares the reserve supply of fat in the body, which would otherwise have to be burned to give the necessary warmth. In sickness, where but little or no fatty material is supplied by the food, this is of course conservative, but in health no need is felt for a specially combustible form of fuel, and so we see how many persons in good health, under the combined influences of good living, alcohol and bodily inactivity, grow very fat, the alcohol supplying a good deal of the heat required by the system, and some unburned fat continuing to be stored away year after year.

I have convinced myself by a series of experiments that alcohol is completely destroyed in the animal organism.[2] If pure it leaves no taint upon the breath, and where this is present it is attributable to some of the ethers or fusel oil. Thus, in the experiments referred to, I found only traces. I used three different methods: the chromic acid and the iodoform test, and Geissler's Vaporimeter. Their correctness was always controlled by known dilutions in water containing most minute fractions of alcohol. The urine may, under favourable circumstances, contain as much as three per cent. of all the alcohol consumed. This is the highest figure I have been able to get. Aldehyde and acetic acid, the derivatives of alcohol, were absent. The facts observed all seem to lead to the conclusion that alcohol in the body, just as in the flame of the spirit-lamp, is oxidized to carbonic acid and water.

Such being the case, it is evident that every molecule of alcohol burned within the system must yield, not only warmth, but that power to accomplish work with which the development of caloric is always accompanied. Let us see how much.

From direct experiments made by Favre and Silbermann, and by Frankland in England, with a view to ascertain the relative heating power possessed by various combustible substances, gases, etc., it was found that alcohol gave the figure 7; pure coal gave 8, and hydrogen 34.5; which is to be understood as meaning, that one cubic centimetre of alcohol generates heat enough during its combustion to raise the temperature of seven litres of water 1° Cent.; that one cubic centimetre of coal sufficed to raise eight litres 1° Cent., and so on. The unit of the scale thus arbitrarily set up is represented by the amount of heat required to raise the temperature of *one* litre of water 1° Cent., and to this unit the name *Calorie* has been applied. A healthy adult produces about 2300 such *calories* a day. Now, in the process of consuming 100 cubic centimetres of absolute alcohol, equal to one litre of good hock, we set free within our organism 700 *calories*, or nearly one-third of the whole amount of warmth which is produced by the system under mixed diet within twenty-four hours.

With this result given by alcohol, let us now compare the heat-producing power of certain other ingesta as determined by Frankland; for instance, cod-liver oil, a substance which may be taken here as a type of the fatty elements of food in general, being one of the most digestible. Its calorific power is represented by the figure 9.1. Four tablespoonfuls taken four times a day—about 50 cubic centimetres—develop 455 *calories*, supposing the whole quantity to be digested, and this, it will be seen, is only about four-sevenths of what 100 grammes of alcohol supply, or in other words, not more than would be furnished by 65 grammes of alcohol.

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[1] Ether, it is true, acts as a cardiac stimulant, but as such it contributes no *new* force to the heart; all it does being to excite the heart so as to make it put forth what force it already has more energetically. In other words, instead of contributing fresh power, it drains away more rapidly that which is left.

[2] Cf. Centralbl. f. d. Med. W. 1875, p. 371. Berlin.

The advantage possessed by the latter over the oil is obvious. Besides being infinitely more pleasant to take, the alcohol, if largely diluted with water, in the form of good wine, is readily digested, even in the weakest stomach; and, as has been shown, it is easily and completely disintegrated in its passage through the system. On the other hand, all fatty substances require for their emulsion, absorption, and assimilation, a very considerable amount of work, which of course is only that much more drain upon the powers of a patient.

Thus we can understand how it is that a continual supply of wine enables the patient to resist for a certain length of time the ravages of a severe disease, where no other form of nourishment is accepted by his stomach. Every practising physician who recognizes the value of wine in therapeutics will be able to call to mind cases of typhoid fever, where for several days nothing was taken but wine and water, the patient retaining his strength pretty well all the while. Bricheteau, a French surgeon, relates the case of a boy affected with diphtheria, upon whom the operation of tracheotomy was performed, and who for a month afterwards would take nothing but sweet wine, of which he consumed one and a half bottles daily, besides two ounces of rum, and who during the whole time did extremely well. In this case the sugar of the wine of course contributed something as a food to the whole effect, but being present in the sweetest wine only in small proportion, it could have accomplished only very little.

In such cases it would be unreasonable to suppose that the vital powers of the patient are kept up solely by the stimulating properties of the alcohol, for the nervous system and heart require nourishment as well as any of our other organs, and they cannot be kept going so long by stimulants alone. On the contrary, by so urging them on to activity day after day, without supplying any food to compensate for the wear and tear resulting from such augmented action, it is certain that we would exhaust their forces more quickly than by any other plan of proceeding. Alcohol certainly acts as a stimulant in conditions of extreme weakness, but given for days together when no other combustible material is being supplied to the system, it burns in the tissues, and by means of the heat thus generated, furnishes the body with warmth and the strength necessary to carry on its vegetative functions.

Prof. B. points out the great importance of administering a form of alcoholic beverage free from fusel oil, for if we introduce into the system of a sick man any alcoholic mixture containing fusel oil, the evil effects produced by the latter upon the brain, in this case already weakened by disease, will manifest themselves yet more strongly than they would upon a healthy one.

Finally, he sums up his views, as far as the same concern the practice of medicine, as follows: 1. That alcohol is very frequently a stimulant of transitory power; 2, that in relatively large doses it can serve as a vigorous antipyretic; 3, alcohol, given in small and oft-repeated doses, is a food particularly adapted to cases where the stomach can take in no other "combustible material" to supply warmth and working energy to the organism.

While I thus share in the views which the late Dr. Anstie so ably upheld in England, I do not hesitate, on the other hand, to declare, with respect to the requirements of the healthy organism, that I consider the use of alcohol in health as entirely superfluous.

Where the digestion is healthy, and where a sufficient transfer of nutritive material takes place from the food to the blood, the human body is capable of accomplishing all the functions for which it is designed, and that without the use of spirituous drinks. But the case assumes a different aspect as soon as these two conditions fail. A physician may therefore recommend total abstinence to healthy persons in every instance, but he throws away one of the most valuable of medicines if he carries this principle of *teetotalism* into the sick-room.

3. *Application of Quinia in Fever.*—Prof. C. Binz makes (*The Practitioner*, June, 1876) the following practical remarks on this subject: "It is to be given (1) in large doses from 0.5 to 3.0 grammes (8–48 grains); (2) in a digestible form, that is to say, together with some acid; and (3) during the time when fever tends to decrease.

"The first has been proved by numerous observations in the sick-room. Such strong doses are not poisonous, but agree on the whole better with young than with old people. My second rule refers to the fact that in fever the stomach does not contain sufficient acid to dissolve the sparingly soluble sulphate. As to the hour of administration, we have to deal here, as a matter of course, with similar conditions as in ague fever. The cause of fever is overcome by quinine most easily when its activity is lowest.

"The complaint has often been raised that quinine so easily causes sickness, and it is generally supposed that the vomiting is produced by direct irritation of the stomach. This is not proved to be the case. On the contrary, if the doses of quinine are continued, at the most only a small part of the second or third are ejected. All later ones remain. The stomach absorbs it as hitherto, the nervous system by degrees tolerates the alkaloid, and now only it begins to act upon the chemical processes of the feverish organism. It is very important not to make use of impure quinine. Quinine containing the less efficacious cinchonine is the most deceptive, for this adulteration is somewhat difficult to detect, at least for many practitioners. Much the same must be said of salicine, the bitter principle of willow."

4. *Salicylic Acid as a Febrifuge.*—Prof. C. Binz states (*The Practitioner*, June, 1876), that "Salicylic acid possesses in all outward respects a resemblance to quinine. It combats the malarial poisoning (Senator, Buss)—although less surely and effectually than quinine—during the period of apyrexia, where, as is well known, neither the pulse nor respiration necessarily need present the slightest abnormity. It is, like quinine, a powerful antizymotic, which can be introduced into the organism in large quantities, circulates there a considerable length of time, and is given off again—at least partially—in an unchanged condition. Even the ringing in the ears and the slight deafness characteristic of cinchonism are not wanting in connection with the medication with salicylic acid. A complete agreement between its behaviour and that of quinine toward certain disease-producing agencies, known, as must be confessed, only by their effects, does not exist. This we have already seen in speaking of intermittent fever. Acute articular rheumatism, a disease in which quinine avails so little and salicylic acid so much, furnishes a second and converse example. Considering the chemical dissimilarity of the two substances, it is not to be expected that there should exist a similarity between their modes of action on more than the general points involved. This general resemblance, however, is unquestionably present, and so we shall have to seek an explanation of the manner in which their therapeutic action is exerted in the same channels."

5. *Effects of Salicylate of Soda in Reducing the Temperature of the Body.*—Professor Köhler, of Helle, shows that both salicylic acid and the salicylate of soda, when injected into the blood in rabbits, not only cause a fall in the blood-pressure, but also a marked diminution in the frequency of the pulse, and also in that of the respirations; but that whereas the soda-salt acts equally well, whether injected into the jugular vein or into the stomach, the salicylic acid in aqueous solution (1 in 300) has no effect, when given by the stomach, either in reducing the blood-pressure or retarding the pulse. It is, therefore, according to Köhler, almost certain that salicylic acid becomes converted into its soda-salt by combination with the alkali present in the intestinal secretions, and that it is absorbed into the blood and produces its physiological action in this form. The reason why a solution of the acid injected into the stomach of a rabbit remains inactive is, probably, that it is unable to combine with sufficient alkali to supply an effective dose of salicylate of soda. According to the physiologist, therefore, salicylate of soda is preferable to salicylic acid as a

drug, because its action is direct, whilst that of the latter is indirect; and it is further preferable, because it possesses all the useful properties of the acid without its disadvantages; and—what especially interests us here—because it has a most distinct power of reducing the temperature of the body, not only in fever, but also in the healthy state. Thus 26 cubic centimetres of a solution of 1 in 30, injected into the stomach of a rabbit weighing two kilogrammes, reduced the temperature from 36.2° to 34.6°, and even to 34.0 C.; and the same quantity of a solution of 1 in 60 injected into the jugular vein reduced it to 35.2°. On the other hand, Professor Köhler, from his own observation of the effect of the salicylate (in one or two five-gramme doses) on patients with typhoid fever, completely agrees with those observers who have praised its anti-febrile properties in that disease; and he states that the temperature can be reduced by it for twenty-four hours, or even longer. The fact that the salicylate, according to Köhler, reduces even the normal temperature, agrees with Riess's results in the healthy human subject; for the latter found that five grammes reduced the temperature 0.9° C. on an average of twenty-three experiments in from four to six hours. Comparing the other results of experiments on animals with the effects of the drug on man, we find that there is a discrepancy between the statements of observers—which, however, is perhaps more apparent than real; thus, whilst Riess and Goltdammer observed that the only effect of the drug on the pulse was to make it stronger, without diminishing its frequency, Nathan observed not only that the number of beats became much smaller, but he also found that the respirations fell almost to their normal number. He gave, however, much larger doses than the other two—as much as eight grammes at a time, followed sometimes in two hours by a second dose of four grammes; and as it was after very large doses that Köhler found the pulse and respirations so much affected in rabbits, it seemed likely that it may require similarly large doses in man to modify the functions of respiration and circulation.

All things considered, the salicylate of soda promises well as an anti-febrile remedy. Much less unpleasant to take than quinine, producing no irritation of the digestive organs or of the kidneys, and completely free from narcotic properties, time may not improbably confirm Professor Köhler's estimate of it, when he predicts for it the greatest future of any of our scanty stock of drugs which reduce the temperature of the body.—*Med. Times and Gaz.*, May 6, from *Centralblatt Med. Wiss.*, Nos. 10 and 11, 1876.

6. *On the Therapeutical Use of Nitrite of Amyl.*—Dr. ROBERT PICK (*Deutsches Archiv für Klin. Med.*, Feb. 1876), after describing the physiological properties of the nitrite of amyl, adduces the experience of several German physicians as to its therapeutical uses in various affections, chiefly of a nervous character. In cases of epilepsy, for instance, the inhalation of a few drops of the nitrite, taken at the moment of the sensation before the paroxysm, acted as a palliative, and sometimes warded off the attack altogether. Dr. Mäurer, of Laubbach, near Coblenz, has given the drug in several complaints in which a spastic contraction of the vessels appeared likewise to play a part. In hemicrania, for instance, he found it very useful, and also in the colic of menstruation, and in anæmia of the brain; and as he thinks that many cases of epilepsy depend on this anæmia, caused by spastic vascular contraction, his success with the nitrite in some epileptic cases is explained. Dr. Pick relates a few cases from his own experience where the nitrite was more or less useful, the complaints being hemicrania, neuralgic pains in the face and head, and supra-orbital neuralgia. He also found it useful in a case of convulsions in a child, and he has often employed it with beneficial and rapid effects in cases of fainting fits.—*Brit. and For. Med.-Chir. Review*, April, 1876.

7. *Physiological Action of Gelseminum Sempervirens.*—In a series of articles which have recently appeared in the *Lancet*, Dr. BURDON SANDERSON has shown that gelseminum exercises a very remarkable influence on the function of respiration, and that when the drug is given in fatal doses death takes place, as in poisoning by curare, by gradual arrest of the respiratory

movements. Facts have also been referred to which plainly indicate that this result is not, as in the case of curare, to be attributed to suspension of the functions either of the motor nerves or of the muscles to which they are distributed, so that the conclusion can hardly be avoided that this agent exercises its influence directly on the cerebro-spinal centres, and particularly on those parts which preside over the rhythmical respiratory movements.

In a further consideration of this subject (*Lancet*, April 1, 1876), Dr. Sanderson concludes that the drug acts on the respiratory function by paralyzing the automatic respiratory centre; but that the process of extinction of the respiratory movements, which might otherwise be expected to be gradual and progressive, is prevented from being so by the intervention of disturbances of which the explanation is to be found in the imperfect arterialization of the circulating blood.

8. *Gelseminum Sempervirens.*—The Nos. of the *Lancet* for January 22d and March 18th, contained an account of some experiments made by Dr. SYDNEY RINGER and Mr. WM. MURRELL on the action of this article. These experiments show: "1. That, in animals, gelseminum primarily affects respiration. 2. That it reduces the frequency of the respiratory act. 3. That the affection of respiration appears before the paralysis, and passes off earlier. 4. That gelseminum causes death by asphyxia. 5. That, if artificial respiration be maintained until the drug can be eliminated, recovery will take place.

"Such are the facts. What is their explanation? On what part of the respiratory system does the drug exert its influence? Dr. Burdon-Sanderson has kindly consented to make the experiments necessary for the solution of these problems, and will publish the results in the ensuing paper."

9. *Antiseptic Properties of Madder Root.*—M. DE RESTAING read a note to the Academy of Medicine of Paris on this subject. A specimen of meat had been preserved from July 27, 1875, to February 27, 1876, in a jar containing powdered madder, which was opened a dozen times to verify the results obtained. The weight of the meat had decreased from 119 to 25 grammes, without any smell, or any development of living organisms having shown themselves. From these experiments, the author thought it would be advisable to institute similar trials for the preservation of dead bodies; perhaps by this method means might be found of conciliating the presence of cemeteries in the vicinity of great cities with the sanitary conditions which now so greatly occupy public attention.—*Lond. Med. Record*, May 15, 1876.

10. *Erythroxylon Coca.*—Prof. BOUCHARDAT states that this article, introduced into France some years ago, has rendered most valuable service in therapeutics almost equal to that rendered by the cinchona bark. M. Bouchardat considers the coca as a stimulant to the nervous and muscular systems, and ranks it as such with tea and coffee. He terms it also a "substance d'épargne," or that which prevents the rapid waste of tissue, and thus enables the consumer to go a long time without food. The leaves are either masticated or made into an infusion, and used like tea with rum and sugar, or with sugar and milk. The leaf contains an essential oil, which is of an aromatic odour coupled with the flavour of the fresh plant. The slightly acid and bitter taste of the leaf may be attributed to the presence of tannin, and to an alkaloid somewhat analogous to atropine, and is termed "cocaine." An infusion made with the leaves is perfectly clear and of beautiful yellow. It has an agreeable odour, and like the leaf itself is slightly acid and bitter. Many of the French people use the infusion as a substitute for tea, to which the coca is preferred, owing to its being more stimulating, and at the same time less expensive. A "pharmacien," named Joseph Bain, was one of the first to introduce it into medicine in France, in the form of elixir and wine which are frequently prescribed in prolonged convalescence, and in cases accompanied with great prostration of strength.—*Brit. Med. Journ.*, April 15, 1876.

11. *Experiments on Ergot of Rye.*—Dr. G. LEVI concludes (*La Sperimentale*, Nos. 8 and 9, 1875) from experiments undertaken by him that it is to the phosphoric acid it contains that ergot of rye owes its properties.

After having shown the effect obtained in three bitches by the employment of medicinal phosphoric acid, he relates two observations made at the Maternity of Pisa by Dr. Garzella, on two women aged respectively twenty-five and twenty-eight years.

The following are the conclusions from the researches of Dr. Levi:—

(1) The therapeutic effects derived from ergot of rye are due to the phosphoric acid it contains.

(2) In the diseases in which the employment of ergot of rye is useful, the employment of phosphoric acid renders identical service.

(3) Phosphoric acid acts with equal intensity and rapidity with ergot of rye.

(4) The quantity of soluble phosphoric acid found in recently powdered ergot of rye is in proportion to the activity of the drug.—*British and Foreign Med.-Chir. Review*, April, 1876.

12. *Anæsthetic Action of Croton Chloral.*—M. CHOUPPE communicated to the Paris Biological Society (May 6, 1876) the result of his experiments on the anæsthetic effects of croton-chloral injected into the veins. Complete anæsthesia was produced by the injection of gr. j of this substance; to obtain a like result from chloral would require about gr. iij. The sleep was not accompanied by any cardiac disturbance, and the acceleration of respiration was temporary.

M. Trasbot mentioned that in experiments made at Alfort, small hemorrhagic spots were found in the lungs after the injection of anæsthectic agents, and in one case even death resulted from pulmonary hemorrhage.—*Le Progres Médicale*, May 13, 1876.

MEDICAL PATHOLOGY AND THERAPEUTICS, AND PRACTICAL MEDICINE.

13. *Inflammation.*—Dr. G. THIN has published in the *Edinburgh Med. Journ.* a series of papers on this subject, the drift of which he thus summarizes in his concluding paper in the No. for April last.

"My object has been to show that when a tissue is the seat of the changes which constitute the condition known as inflammation, these changes are divisible into two categories, the destructive and the reparative. The destructive changes consist, as regards the fibrillary tissue, in swelling, softening, chemical change, and disintegration; as regards the cellular elements, in division of the nuclei into small parts, swelling, death, and disintegration of the cell. The destructive change extends towards the bloodvessels, or directly implicates them; the weakened vessel permits the escape of the fluid and formed elements of the blood, and with the exhaustion or removal of the cause of the primary destruction, the process of repair begins by organization of the plasma and colourless blood cells. From the former, the ground substance (fibrillary tissue, etc.) is formed; from the latter, all the cellular elements, of what form soever. Flat cells, spindle and stellate cells, non-striped muscle cells, epithelial cells, all owe their origin to the lymph (or colourless blood) corpuscles. But the type of cell once established by the development of the original corpuscle, there is afterwards neither retrogression nor metamorphosis. The epithelial cell never again becomes or produces the colourless blood cell, nor the spindle cell develop into an epithelial cell. *Omnis cellula e cellulâ*, but not in the sense of new cells being begotten by the fixed cells of developed tissue. With the development of the free lymph cell of the fluids into a fixed element of the tissue, the power of reproduction is lost. So much, at least, I believe to be proven in regard to inflammation.

"The changes which cells undergo in this process have been erroneously asso-